Split Regular Hom-Lie Algebras

We introduce the class of split regular Hom-Lie algebras as the natural extension of the one of split Lie algebras. We study its structure by showing that an arbitrary split regular Hom-Lie algebra $\mathfrak{L}$ is of the form $L = U + \sum_j I_j$, where $U$ is a certain linear subspace of a maximal abelian subalgebra of $\mathfrak{L}$ and the $I_j$ are well described (split) ideals of $\mathfrak{L}$ satisfying $[I_j, I_k] = 0$ if $j \neq k$. Under certain conditions, the simplicity of $\mathfrak{L}$ is characterized and it is shown that $\mathfrak{L}$ is the direct sum of the family of its simple ideals.

Keywords: Hom-Lie algebra, roots, root space, structure theory.

MSC: 17A30, 17A60, 17B65, 17B22